

Notice of Allowability

Application No.

10/685,115

Applicant(s)

BELL ET AL.

Examiner

Raquel Y. Gordon

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to transmittal letter filed 10/14/2003.
2. ☒ The allowed claim(s) is/are 1-14.
3. ☒ The drawings filed on 14 October 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

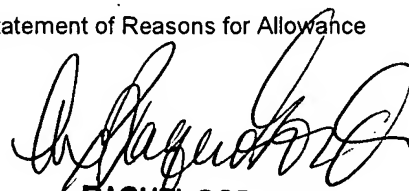
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 01/23/2004
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


RAQUEL GORDON
PRIMARY EXAMINER

Reasons for Allowance

The following is an examiner's statement of reasons for allowance: Upon consideration, the inclusion of the claimed inkjet printhead assembly, as claimed in the combination, is not found in the prior art. This difference is considered patentable over the prior art and reflects an improvement in the field of endeavor since the following claim limitations reflect an improvement in the field of endeavor and over the prior art of record.

1. An ink jet printhead for an ink jet printer comprising a nozzle plate attached to a heater chip, the heater chip including a semiconductor substrate, a resistive layer deposited on the substrate, a dielectric layer deposited on the resistive layer, a cavitation layer for contact with ink, and an adhesion layer between the dielectric layer and cavitation layer, wherein the dielectric layer is selected from the group consisting of silicon carbide/silicon nitride (SiC/SiN), diamond-like carbon (DLC), and doped DLC, the cavitation layer is selected from the group consisting of tantalum (Ta), titanium (Ti), and platinum (Pt), and the adhesion layer is selected from the group consisting of tantalum nitride (TaN), tantalum oxide (TaO), silicon nitride (SiN), and titanium nitride (TiN), provided the adhesion layer and cavitation layer are selected so that the adhesion layer has no elemental component in common with the cavitation layer when the dielectric layer is comprised of SiC/SiN.

10. A method for enhancing adhesion between a dielectric layer and a cavitation layer of an ink jet printhead heater chip comprising the steps of: providing a semiconductor substrate, depositing an insulating layer on the substrate, the insulating layer having a thickness ranging from about 8,000 to about 30,000 Angstroms, depositing a resistive layer on the insulating layer, the resistive layer have a thickness ranging from about 500 to about 1,500 Angstroms and being selected from the group consisting of TaAl, Ta.sub.2N, TaAl(O,N), TaAlSi, TaSiC, Ti(N,O), WSi(O,N), TaAlN, and TaAl/Ta, depositing a first metal layer on the insulating layer and etching the first metal layer to define ground and address electrodes and a heater resistor therebetween, depositing a dielectric layer on the heater resistor, the dielectric layer having a thickness ranging from about 1000 to about 8000 Angstroms and being selected from the group consisting of silicon carbide/silicon nitride (SiC/SiN), diamond-like carbon (DLC), and doped-DLC, inserting an adhesion layer on the cavitation layer, the adhesion layer having a thickness ranging from about 100 to about 1000 Angstroms and being selected from the group consisting of tantalum nitride (TaN), tantalum oxide (TaO), silicon nitride (SiN), and titanium nitride (TiN), and depositing a cavitation layer on the adhesion layer, cavitation layer having a thickness ranging from about 1,500 to about 8,000 Angstroms and being selected from the group consisting of tantalum (Ta), titanium (Ti), and platinum (Pt), wherein the adhesion layer and cavitation layer are selected so that adhesion layer has no elemental component in common with cavitation layer when the

dielectric layer comprises SiC/SiN.

Meyer et al. (US 5682188) discloses a similar invention (see figs 2 and 3), but is deficient in the teaching of the claimed combination. For example, contrary to the claims, there is no dielectric SiC, SiN, diamond-like carbon or doped diamond-like carbon layer between resistive layer 22 and adhesion layer 34. In column 4, lines 1-13, Meyer et al. discloses the layer may be doped with oxygen to make the layer more resistive. However, Meyer et al. is silent and does not suggest obtaining dielectric characteristics as would result if a dielectric were interposed between the resistive layer 22 and the adhesive layer 30. as claimed.

Hindman et al. (US 6441838) discloses a similar invention (see fig. 4), but is deficient in the teaching of the claimed combination. For example, contrary to the claims, the adhesion layer 63, has a component Ta in common with the cavitation layer 61, when the dielectric layers 59 and 60 are comprised of SiN and SiC, respectively.

Pan et al. (4965611) discloses a similar invention (see fig 1), but is deficient in the teaching of the claimed combination. For example, contrary to the claims, Pan et al. disclose an unpassivated resistive layer 16. Further, while the claims recite a dielectric comprised of SiC, SiN, diamond-like carbon, or doped diamond-like carbon (i.e. passivation layer), Pan et al. disclose SiO₂, different from the claims. Furthermore, to sufficiently teach the claims, Pan et al. would have to suggest providing an adhesive layer at least between elements 14 and 12, and a cavitation layer on the opposite side of

element 12, but fails to do so. Brann (US 4956653) fail to teach the claimed invention for similar deficiencies as Pan et al.

Silverbrook (US 2004/0113988) discloses a similar invention (fig. 1), but is deficient in the teaching of the claimed combination. For example, Silverbrook teaches a heater 10 covered with a coating of diamond-like carbon. However, contrary to the claims, Silverbrook teaches using a chemical vapor deposition (CVD) in lieu of adhesives to avoid alignment issues that result during the curing process (see ¶ 0174).

An extensive and exhaustive search by the Examiner revealed no patent or other non-patent literature which anticipate the claimed combination, disproved novelty of the claims, or deemed the claims to be obvious.

Hence, the independent claim is allowed, and the dependent claims are allowed since they depend from an independent base claim.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Raquel Y. Gordon, whose telephone number is (571) 272-2145. The Examiner can normally be reached on M Tu Th and F 8:30-6:00.

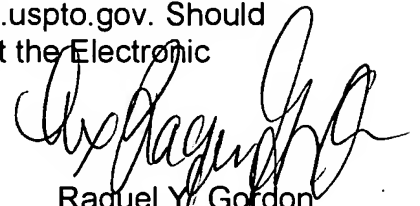
If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. A fax number is available upon request.

Any inquiry of a general nature or relating to the status of this application or proceeding may be directed to the Examiner or Supervisor.

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The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Raquel Y. Gordon
Primary Examiner
Art Unit 2853
April 15, 2005

**RAQUEL GORDON
PRIMARY EXAMINER**